Exploring consumer adoption of proximity mobile payments

The widespread penetration of proximity mobile payment systems could drastically change the methods in which consumers purchase goods and services. However, earlier forecasts of the success of these systems have been substantially reduced due to lower than anticipated uptake of the supporting Near Field Communication (NFC) technology. This study explores the potential of a new model of consumer technology adoption, and its extension with trust and risk constructs, in explaining non-users' adoption of proximity mobile payments. Analysis of data collected from 244 UK consumers reveals that the extended model explains more variance in behavioural intention, but performance expectancy remains the strongest predictor across both models. The findings provide new and important theoretical and practical contributions, particularly for strategic development and marketing of proximity mobile payments in the UK.

Keywords: mobile payments; NFC; adoption; UTAUT2; trust; risk

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Introduction

Mobile payments (MPs) combine payment systems with mobile devices and services to provide users with the ability to initiate, authorize, and complete a financial transaction over mobile network or wireless communication technologies (Chandra et al., 2010; Lu et al., 2011). The widespread penetration of mobile devices and their almost constant proximity to the user, together with their storage and transmission capabilities, appear to make them suitable for a variety of payment scenarios and for storing everything that would normally be carried in a physical wallet (Mallat, 2007). For an increasingly saturated market, MPs provide mobile network operators (MNOs) the opportunity to develop new business models and hence revenue opportunities (Chen, 2008). However, a key issue in financial service providers embracing new technological platforms is the consideration of the impact of new services on customer satisfaction (Durkin et al., 2007).

MPs that use Near Field Communication (NFC) chips are a type of proximity MP. Proximity MPs followed the development of remote MPs (see Slade et al., 2013). NFC enables two-way, short-range communication to facilitate the transmission of information between an enabled mobile device and payment terminal, or two enabled devices, when in close proximity to each other. This two-way information exchange enables service providers to log customer preferences and offer personalised coupons and discounts to customers (Ondrus and Pigneur, 2009).

The UK Cards Association (2012) has predicted that NFC will be 'the next major technological advance in… payments across the UK' (ibid., p.21) and arguably represent the most dramatic innovation opportunity for financial service providers since the concept of online banking. Indeed, NFC MPs are receiving increasing focus from enterprises: Google has developed GoogleWallet, Barclaycard has collaborated with Orange to offer QuickTap, MasterCard has partnered with telco joint venture Weve, and Samsung's Smart Ticket app facilitates NFC payments at Samsung Galaxy Studio Live music events. However, despite the efforts and resources that system providers have invested, worldwide adoption of NFC MPs has been low, and forecasts of transaction values have been reduced by up to 40 per cent (Gartner, 2013). This suggests that NFC MP providers need to better understand the drivers of consumer acceptance of MPs to modify their development and marketing strategies according to consumers' needs (Schierz et al., 2010). Moreover, since successful MP business models cannot be directly imported to different cultural contexts due to the varying market constraints in terms of economic, technology, and social aspects (Ondrus et al., 2009), then examining NFC MP adoption in the context of the UK, where to date no similar research has been undertaken, is also important.

NFC MPs offer a number of advantages due to the ubiquity of the device; however, they also involve uncertainty and risk due to the vulnerability of both the devices and networks to hacker attack (Au & Kauffman, 2008; Zhou, 2014). Market research by YouGov found that a significant portion of resistance to the technology amongst consumers can be attributed to the fact that they do not think it is safe to use (Farmer, 2013). Given the security vulnerability, this research compares the explanatory power of the newest consumer-focussed adoption model, namely Venkatesh et al.'s (2012) Unified Theory of Acceptance and Use of

Technology (UTAUT2), in determining factors affecting adoption of NFC MP with that of UTAUT2 extended with trust and risk constructs.

The remainder of the paper is organized as follows. Firstly, we will review MP adoption-related research. We will then develop the theoretical hypotheses to be tested. Following this is a section detailing the research methodology employed, and the presentation and discussion of the research findings and their theoretical and practical implications. Finally, we draw conclusions from the study, outline the limitations, and make suggestions for future research.

Mobile payment adoption research

'As an emerging service, MP has not received wide adoption among users' (Zhou, 2014, p.2). A review of the extant literature via *Google Scholar*® and *Scopus*® reveals that 25 quantitative studies have tried to identify the factors affecting MP adoption behaviour. Just over 50 per cent of these studies have drawn on Davis' (1989) Technology Acceptance Model (TAM) as a theoretical base. Given the novelty of the context, behavioural intention has been utilised by the majority of the current MP adoption research as a substitute for usage, which is supported, for example, by Hu et al., 1999.

Kapoor et al.'s (2014) study sought to compare the predictive capacity of different sets of competing attributes on the diffusion of the Interbank Mobile Payment Service in India; relative advantage, compatibility, complexity and trialability explained 62 per cent of variance in behavioural intention. Schierz et al. (2010) extended TAM to explore acceptance of MPs in Germany; their model achieved the greatest predictive ability to date in the MP context, explaining 84 per cent of variance in behavioural intention. Three studies have employed Venkatesh et al.'s (2003) UTAUT to examine MP adoption (Hongxia et al., 2011; Thakur, 2013; Wang & Yi, 2012). However, in common with most adoption research employing UTAUT, none of these studies analysed the effects of any moderating variables (Williams et al., 2011).

Mallat (2007) suggests that consumer adoption behaviour in relation to MP is a key issue. The majority of MP adoption studies have referred to the technology in a general sense without specific consideration of different payment scenarios or technologies. More recently, some studies have examined adoption of specific systems, such as Zong MP in Spain (Liébana-Cabanillas et al., 2014), Interbank MP Service in India (Kapoor et al., 2014), and Ali Pay (Lu et al., 2011) in China. To date only two studies have explicitly examined adoption of NFC MPs, both in the Malaysian context (Leong et al., 2013; Tan et al., 2014). Tan et al. (2014) extended TAM with behavioural constructs and finance-related risk constructs. Surprisingly perceived risk was not found to significantly influence behavioural intention, and personal innovativeness was found to be the most significant predictor of behavioural intention.

Development of the theoretical model

While TAM has provided a reliable and valid model of user technology adoption, it was originally developed for the organizational context and it has been criticised: for supplying very general information on individuals' opinions of novel technologies; for

having a deterministic approach without much consideration for users' individual characteristics; and for assuming that usage is volitional without constraints (Agarwal & Prasad, 1999; McMaster & Wastell, 2005). In common with other IS adoption models, such as TAM, UTAUT was also originally developed to explain employee technology acceptance within an organizational context. Based on a further review of the extant literature, Venkatesh et al. (2012) proposes the extension of UTAUT, to what they term UTAUT2 (Figure 1), in order to tailor it specifically to the consumer technology acceptance context.

Venkatesh et al. (2012) suggests that future research should apply UTAUT2 in different countries, across different age groups, and on different technologies. Although Leong et al. (2013) suggest the use of UTAUT2 to examine consumer adoption of MP, no study has yet undertaken this research. Almost all MP adoption research has extended the chosen theoretical foundation. This has also been the case with much of the research that has utilised UTAUT (Williams et al., 2011). Marketing literature has long recognised perceived risk and trust as important factors that influence consumer behaviour (e.g. Chang and Wu, 2012; Peter and Tarpey, 1975; Sichtmann, 2007). For these reasons we compare the effectiveness of UTAUT2 in explaining non-users' intentions to use NFC MPs with an extended model that includes perceived risk and trust. In accordance with much of the UTAUT literature aforementioned (Williams et al., 2011), this study does not explore the role of moderating variables.

Research hypotheses

Performance expectancy in the consumer context is 'the degree to which using a technology will provide benefits to consumers in performing certain activities' (Venkatesh et al., 2012, p.159). In their original model Venkatesh et al. (2003) found performance expectancy to be the strongest predictor of intention; however, in the consumer context, Venkatesh et al. (2012) found hedonic motivation and habit to be more important drivers of behavioural intention than performance expectancy. The effect of performance expectancy on behavioral intention has been supported in the MP context (Hongxia et al., 2011; Thakur, 2013; Wang and Yi, 2012). As NFC MPs offer a quicker payment method and could lead to the end of carrying cash and cards, then they offer utilitarian benefits that are likely to be important drivers of adoption. Thus the first hypothesis is:

> H1: Performance expectancy has a positive influence on intention to use Near Field Communication mobile payments

Effort expectancy in the consumer context is 'the degree of ease associated with consumers' use of technology' (Venkatesh et al., 2012, p.159). Effort expectancy is one of most significant predictors of intention to use MP in Wang and Yi's (2012) study. Whilst Thakur (2013) also finds effort expectancy to have a significant effect on behavioural intention, Hongxia et al.'s (2011) findings do not support this relationship. Nevertheless, as NFC MPs use different and novel technologies to existing payment systems then it is likely that the perceived degree of ease associated with using NFC MP will affect behavioral intention, hence:

H2: Effort expectancy has a positive influence on intention to use Near Field Communication mobile payments

Social influence in the consumer context is 'the extent to which consumers perceive that important others (e.g. family and friends) believe they should use a particular technology' (Venkatesh et al., 2012, p.159). The underlying assumption is that individuals tend to consult their social network to reduce any anxiety which arises due to uncertainty of a new technology. Of the four original UTAUT constructs, social influence has been the most tested in the context of MP, and its effect on behavioural intention has acquired more support (Hongxia et al., 2011; Tan et al., 2014; Yang et al., 2012) than rejection (e.g. Shin, 2010; Wang & Yi, 2012). As non-users of NFC MPs may be concerned about financial risks associated with a new payment system then they are likely to seek reassurance from important others. We hypothesize:

H3: Social influence has a positive influence on intention to use Near Field Communication mobile payments

Venkatesh et al. (2012) defined **facilitating conditions** in the consumer context as 'consumers' perceptions of the resources and support available to perform a behavior' (ibid., p.159). The effect of facilitating conditions on behavioural intention has gained support in the MP context (Thakur, 2013), although the relationship has not been widely examined. As NFC MPs use unfamiliar technologies and offerings are currently fragmented then logically facilitating conditions are likely to affect behavioural intentions, so:

H4: Facilitating conditions have a positive influence on intention to use Near Field Communication mobile payments

Recognizing the differences between organizational and consumer contexts, Venkatesh et al. (2012) added **price value** to UTAUT2, which they defined as 'consumers' cognitive tradeoff between the perceived benefits of the applications and the monetary cost for using them'. Although price value has not been tested in the MP context, perceived financial cost (Hongxia et al., 2011; Kapoor et al., 2014; Lu et al., 2011) has been found to negatively affect behavioural intention. Yang et al. (2012) found that perceived financial cost negatively affected behavioural intention for non-users, but was not significant for actual users. Tan et al. (2014) found the effect of perceived financial cost to be insignificant. The financial cost of acquiring an NFC enabled device and subscribing to network charges can be weighed against the perceived benefits of having a convenient payment system. Therefore, a further hypothesis is that:

H5: Price value has a positive influence on intention to use Near Field Communication mobile payments

Habit is the tendency to automatically use a technology as a result of learned behaviour (Venkatesh et al., 2012). Venkatesh et al. (2012) found habit to have a more significant effect on behavioural intention than any other variable including performance

expectancy. However, the opportunity to form habit can only arise when consumers use a technology. It is impossible for non-users of NFC MPs to have formed a use habit, hence it is impossible to measure habit in the sense Venkatesh et al. (2012) intended. Nevertheless, as a type of mobile data service, NFC MPs do use mobile internet (MI) which consumers have already adopted on a much wider scale, hence habit in the sense of MI use can be examined, and so it is hypothesised that:

> H6: Mobile Internet habit has a positive influence on intention to use Near Field Communication mobile payments

To compliment performance expectancy in the consumer context, Venkatesh et al. (2012) include **hedonic motivation** in UTAUT2, defining it as 'the fun or pleasure derived from using a technology' (ibid., p.161). They found hedonic motivation to be the second strongest predictor of behavioural intention in UTAUT2. Although hedonic motivation has not been tested in the MP context, the effect of perceived enjoyment on behavioural intention has gained support in the m-commerce context (e.g. Ko et al., 2009; Zhang et al., 2012). Unlike m-commerce, where hedonic motivation may be associated with perceived enjoyment or fun, in the context of NFC MP hedonic motivation may be derived from consumers' innovativeness and novelty-seeking. Thus, we propose that:

> H7: Hedonic motivation has a positive influence on intention to use Near Field Communication mobile payments

Trust is a subjective belief that a party will fulfil their obligations, and it plays an important role in uncertain financial transactions where users are vulnerable to financial loss (Lu et al., 2011; Zhou, 2013). Trust has traditionally been difficult to define and has been treated as both a unitary and multidimensional concept (McKnight et al., 2002). The effect of trust, as a unitary construct, on behavioural intention has gained significant support (Chandra et al., 2010; Lu et al., 2011; Shin, 2010) in the MP context. Moreover, trust has been found to be the most significant predictor of behavioural intention by some of these MP studies (Chandra et al., 2010; Shin, 2010). Given that the inclusion of trust as a singular, rather than multidimensional, construct has proven successful in this context, then for reasons of parsimony this study will extend UTAUT2 with one construct to measure trust. Chandra et al. (2010) noted that service provider characteristics affect users' trust. As NFC MPs are facilitated by a variety of uncoordinated providers we propose the examination of trust in providers. Trust in the provider suggests that non-users extrapolate from past experiences to predict the future of the supplying firm, hence, the greater the number of positive experiences with a supplying firm, the stronger the consumer's trust will be (Sichtmann, 2007). Based on the existing literature, it is hypothesised that:

> H8: Trust in provider has a positive influence on intention to use Near Field Communication mobile payments

A consumer's perception of **risk** is derived from feelings of uncertainty or anxiety about the behaviour and the seriousness or importance of the possible negative outcomes of

the behaviour (Mandrik and Bao, 2005). Given the infancy of NFC MP systems and the confusing structure of the environment, then it is likely that adoption of NFC MPs will be negatively affected by perceptions of risk. Perceived risk has been a common extension of UTAUT (Williams et al., 2011). The effect of perceived risk, as a singular construct, on behavioural intention has been both supported in some studies (Chen, 2008; Lu et al., 2011; Shin, 2010; Yang et al., 2012), and rejected in others (Hongxia et al., 2011; Kapoor et al., 2014; Tan et al., 2014; Wang and Yi, 2012), in the MP context. Recently, Liébana-Cabanillas et al. (2014) found the negative effect of perceived risk on behavioural intention to be significant for both non-users and existing users of MP. Hence, we propose:

> H9: Perceived risk has a negative influence on intention to use Near Field Communication mobile payments

Research methodology

In common with existing quantitative MP adoption research, a survey methodology was employed. Consumer data were collected via an online survey, using the SurveyGizmo tool, between July and September 2013. Online surveys are convenient and accurate for recording data and also prevent respondents missing items (Chang & Wu, 2012). The survey comprised three overarching sections. The opening questions focused on respondents' existing mobile phone use and knowledge of NFC MP. The middle section contained the measurement items shown in Table 1. The measurement scales were based on a review of previous studies that were consistent with the definitions of the constructs used in this study. Items were measured on a seven-point Likert scale anchored by "strongly disagree" and "strongly agree". Demographic questions were in the third and final section of the survey.

[TABLE 1 NEAR HERE]

A pilot test of the survey instrument was conducted with 40 UK consumers in order to rectify any problems. Following careful consideration of respondents' feedback, minor changes were made to the wording of some questions and the information provided about NFC MP systems. Although concerns relating to the length of the survey were thoroughly considered it was decided that all questions should remain but that a progress bar would be included and provision would be made for respondents to save the survey and continue to completion at a different time.

Because NFC MPs are still an emerging technology in the UK there is no reliable sampling frame from which to conduct probability sampling. Instead, a convenience sampling technique was initially used. To meet the needs of the research, respondents had to consider themselves to be British Citizens or permanently reside in the UK, and they had to be non-adopters of NFC MPs, in order to be eligible to participate. Those who were eligible and agreed to participate were requested to share the survey with at least three other potential respondents, thus utilizing a snowball sampling technique. Given the length of the survey, the opportunity to enter a monetary lottery was used to try to enhance response rates without lowering data quality (Sauermann & Roach, 2013; Deutskens et al., 2004).

As a commonly used technique to examine linear relationships between independent and dependent variables (Irani et al., 2009), regression analysis was used to examine the research hypotheses. There are wide discrepancies in the recommendations of appropriate sample size for regression analyses. As this research measured nine independent variables, a sample size of 90 was determined to be the absolute minimum (Wampold and Freund, 1987). The largest sample size was sought (whilst maintaining quality of data) given time and resource constraints (Sauermann & Roach, 2013). The SPSS 20.0 analysis tool was used for data analysis and a number of tests were utilised to analyse the statistical significance of the results and the models' predictive ability.

Findings

Descriptive analysis

Whilst 324 respondents started the survey on the online tool, only 75.3 per cent of these respondents successfully completed the survey to the end. Therefore, a total of 244 valid and usable surveys were collected for analysis, surpassing our determined acceptable minimum aforementioned. Just over 40 per cent of respondents were aged 18-34. There were slightly more female than male respondents. The overwhelming majority of respondents were employed full-time or were full-time students (Table 2). Assessment of non-response bias was not possible due to the nature of the sampling and online methods utilised.

[TABLE 2 NEAR HERE]

Two-thirds of respondents had been using MI applications for 1 year or more. Although 66.4 per cent of respondents knew that they could use a mobile phone to make payments before starting the survey, only 48.0 per cent of respondents had specifically heard of proximity MPs; only a third of respondents had heard of NFC before starting the survey. Crosstabulation revealed that whilst 43.9 per cent of respondents used MI applications at least several times per week, they did not know whether their mobile handset had a NFC chip. Less than ten per cent of respondents agreed or strongly agreed that they intend to use NFC MP in the future, but an overwhelming 34.1 per cent of respondents disagreed or strongly disagreed. However, only 20.9 per cent of respondents said they would definitely not use NFC MPs even if there was a financial incentive, whilst 48.4 per cent stated they would; the remainder were unsure.

Factor analysis

Whilst the scales for UTAUT2 constructs were adopted from Venkatesh et al.'s (2012) study, perceived risk and trust used a combination of items validated by previous studies. Therefore, it was essential to first examine construct validity before statistically testing the model (Straub et al., 2004). Factor analysis was used, with principal component analysis and Varimax rotation method. The rotated component matrix identified that the nine independent components loaded onto their corresponding constructs with factor loadings greater than 0.5 and did not cross-load, thus confirming the existence of convergent and discriminant validity (Hair et al., 1998) (Table 3).

[TABLE 3 NEAR HERE]

Reliability test

A reliability test was employed as a statistical technique to assess the internal consistency of the measures used. This study tested reliability through calculation of Cronbach's alpha for each construct. All constructs achieved high (0.70-0.90) or excellent (≥0.90) Cronbach's alpha values, the lowest being facilitating conditions (0.731) and the highest being social influence (0.961). These results suggest there was high reliability that the items of each construct were measuring the same content universe (Hinton et al., 2004).

Regression analysis

Significant models emerged for both UTAUT2 (F = 39.692, $p < 0.001$) and the extended model (F = 38.837, $p < 0.001$). Looking firstly at UTAUT2, four of the seven hypotheses were supported: H1, H3, H6, and H7 (Table 4). Performance expectancy was shown to have the strongest influence on behavioural intention, followed by habit, hedonic motivation, and lastly social influence. Surprisingly, the effects of effort expectancy, facilitating conditions, and price value were found to be insignificant, thus H2, H4, and H5 were rejected. UTAUT2 constructs were found to explain 52.7 per cent of variance in behavioural intention.

[TABLE 4 NEAR HERE]

When UTAUT2 was extended with trust and perceived risk, again the effects of performance expectancy, habit, and social influence were found to be significant, as were the effects of the newly added constructs, thus supporting H1, H3, H6, H8, and H9 (Table 5). Perceived risk was found to be the second strongest predictor of behavioural intention after performance expectancy. The addition of trust and perceived risk made the, previously significant, effect of hedonic motivation insignificant, thus H7 was rejected. Again H2, H4, and H5 were also rejected.

[TABLE 5 NEAR HERE]

Multicollinearity

The existence of multicollinearity is a cause for concern when performing regression analysis (Irani et al., 2009). A multicollinearity situation is declared when a high correlation is identified between two or more predictor variables, suggesting the constructs are not truly independent and thus may be measuring redundant information (Myers, 1990). The variation influence factor (VIF) was used to assess multicollinearity. VIF values in the UTAUT2 model ranged between 1.087 and 1.957; for the extended model the VIF values ranged between 1.096 and 2.192. As the maximum recommended value is 10 (Myers, 1990) the variables of this study did not suffer from multicollinearity.

Discussion

The importance of the utility of NFC MPs to non-users was clear from the results. In both models performance expectancy had the most significant influence on behavioural intention. Although in UTAUT2 Venkatesh et al. (2012) found hedonic motivation and habit to be more important drivers of behavioural intention, the difference with our findings could be related to the type of technology being examined: MI examined by Venkatesh et al. (2012) is associated with fun applications such as games, whereas NFC MPs are more utility focussed.

Whilst contradicting Venkatesh et al.'s (2003) model, the lack of support for H2 and H5 concurs with Hongxia et al. (2011) and Tan et al. (2014), respectively. Although the lack of support for H4 is contradictory to Thakur's (2013) findings, our study looked at a type of MP using technology that the majority of respondents did not know about. As Brown et al. (2003) argued in relation to mobile banking adoption, our findings may be due to the fact that the respondents are non-users and thus may not be able to perceive how easy NFC MPs would be to use, whether they have the resources necessary to use them, or whether NFC MP represents value for money.

The support for both H8 and H9 concurs with a number of MP adoption studies (e.g. Lu et al., 2011; Shin, 2010). The inclusion of trust and perceived risk in the extended model improved the explained variance of behavioural intention. The addition of these constructs also made the effect of hedonic motivation insignificant. This suggests that the fun factor derived from a new technology is significantly less important to potential users of NFC MPs than the potential risks associated with them. Indeed, in the extended model, perceived risk had the second strongest influence on behavioural intention after performance expectancy.

Theoretical implications

This research has found the extension of UTAUT2 to perform slightly better than the model alone in explaining non-users' intentions to adopt NFC MPs. However, the explained variance of behavioural intention by both models (52.7 and 58.4 respectively) was significantly lower than that in Venkatesh et al.'s (2012) study (74 per cent). The differences may be due to the difference in technology examined, cultural context, or type of user. However, together with the extension of UTAUT2, these differences in the application of UTAUT2 fulfil a number of recommendations of future research made by Venkatesh et al. (2012) thus making significant theoretical contributions.

The study also providers further theoretical support of the role of trust and risk in the adoption of MP systems. Whilst both constructs have been examined as multidimensional and unitary constructs, our findings support the inclusion of trust and risk as unitary constructs in MP adoption research, which maintains the parsimony of the model.

Practical implications

The findings derived from this study will be helpful to both developers and marketers of NFC MPs seeking to encourage adoption of the technology, particularly during a time where forecasts of success have been significantly reduced.

Au and Kauffman (2008) suggest that because consumers choose to use a combination of payment instruments then MPs must offer higher realised value to compete. Given that performance expectancy is such a significant predictor of intention to use NFC

MP then marketers should design their campaigns to communicate utilitarian messages effectively. Moreover, developers should seek to integrate proximity and remote MP systems to provide enhanced utilitarian benefits. The significance of social influence suggests that marketers should use influential people whose opinions are valued in their marketing campaigns. They might also try to promote interpersonal word-of-mouth via social media rather than focussing exhaustively on mass media advertising of NFC MPs.

Poor prior knowledge of NFC MP by the study's respondents suggests that communication of, and/or information about, the technology being used by MPs has not been effective so far. The ability to gather information about a technology is important in helping to reduce risk (Chang and Wu, 2012) and as perceived risk has a strong negative effect on behavioural intention for non-users of NFC MP then marketers need to resolve these communication problems. The promotion of the safety of the technology is particularly important in reducing perceptions of risk that might have been fuelled by media hype of hacking vulnerabilities (e.g. BBC, 2012).

Given the significance of trust in the provider on behavioural intention, it is crucial that marketing managers help consumers to extrapolate positive past experiences with the supplying firm. Although MNOs focussed primarily on pricing in the past, our findings suggest that their strategies should now focus more on trust-building activities and brand image. Nevertheless, as respondents appeared very interested in financial incentives to use NFC MPs, then integrating such strategies would also be fruitful.

Conclusions, limitations, and future research

This research aimed to explore the potential of a new consumer technology adoption model (UTAUT2), and its extension with trust and risk constructs, in explaining non-users' future adoption of proximity MPs, to facilitate strategic development of the technology. The effects of performance expectancy, social influence, habit, perceived risk, and trust were found to significantly influence behavioural intention to adopt NFC MPs. By gaining a better understanding of the determinants of adoption, it was possible to provide practical suggestions to improve design and marketing of the technology so as to increase uptake. Moreover, the study validated UTAUT2 in a different country and context as suggested by Venkatesh et al. (2012), and also further supported the role of trust and risk in the adoption of MPs.

This was the first study to examine NFC MP adoption in the UK. Given the constraints of the study in terms of time and finance, a convenience sample of non-users was sought. Although the approach taken by this research was acceptable based on previous studies in this area, non-random sampling techniques are associated with less generalizability; thus, future research should seek to test the extended version of UTAUT2 validated by this study with random samples of users of NFC MPs, or subjects from different taxonomies of mobile phone users (Aroean, 2014), to see whether factors such as effort expectancy, facilitating conditions, and price value become relevant after actual use and experimentation with the technology. Longitudinal research of this kind would also test the validity of the model over time and see how its predictive capacity holds when effects on usage are also hypothesised.

This study referred to NFC MPs generally. However, in order to examine customer brand loyalty and a more exact trust in provider then future research should apply the research model that has been developed to a specific brand of NFC MP service provider and see if there are differences for existing customers and non-customers of this provider. Future research should also focus on how NFC MP providers can develop consumer trust and diminish perceptions of risk, and examine the effect that NFC MPs have on customer satisfaction and loyalty.

Although a multitude of factors have been found to affect MP adoption, this study only extended UTAUT2 with trust and perceived risk. Given that in their NFC MP adoption research Tan et al. (2014) found personal innovativeness to be the most significant predictor of behavioural intention, future research could explore further extensions of UTAUT2 with such constructs. Nevertheless, taking into account the findings of this research, marketing managers of NFC MPs have a solid foundation to begin building better interactions with their potential customers and spur adoption of this technology back on track.

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Table 1. Constructs and measures

Construct	Survey measures	Source(s)
Performance expectancy	I would find NFC MPs useful in my daily life; Using NFC MPs would help me accomplish things more quickly; Using NFC MPs might increase my productivity.	Venkatesh et al., 2012
Effort expectancy	Learning how to use NFC MPs would be easy for me; My interaction with NFC MPs would be clear and understandable; I would find NFC MPs easy to use; It is easy for me to become skilful at using NFC MPs.	Venkatesh et al., 2012
Social influence	People who are important to me think that I should use NFC MPs; People who influence my behaviour think that I should use NFC MPs; People whose opinions that I value prefer that I use NFC MPs.	Venkatesh et al., 2012
Facilitating conditions	I have the resources necessary to use NFC MPs; I have the knowledge necessary to use NFC MPs; NFC MPs are compatible with other technologies I use; I can get help from others when I have difficulties using NFC MPs.	Venkatesh et al., 2012
Habit	The use of Internet-based applications (apps) on a mobile phone has become a habit for me; I am addicted to using Internet-based applications (apps) on a mobile phone; I must use Internet-based applications (apps) on a mobile phone.	Venkatesh et al., 2012
Price value	NFC MPs are reasonably priced; NFC MPs are good value for money; At the current price, NFC MPs provide a good value.	Venkatesh et al., 2012
Hedonic motivation	Using NFC MPs would be fun; Using NFC MPs would be enjoyable; Using NFC MPs would be very entertaining.	Venkatesh et al., 2012
Perceived risk	I do not feel totally safe providing personal private information over NFC MP systems; I'm worried about using NFC MP systems because other people may be able to access my account; I do not feel secure sending sensitive information across NFC MP systems; I believe that overall riskiness of NFC MP systems is high; The security measures built into NFC MP systems are not strong enough to protect my finances; Using NFC MP systems subjects your account to financial risk.	Chandra et al., 2010; Featherman & Pavlou, 2003; Lu et al., 2011
Trust in provider	I believe NFC MP service providers keep their promise; I believe NFC MP service providers keep customers' interests in mind; I believe NFC MP service providers are trustworthy; I believe NFC MP service providers will do everything to secure the transactions for users.	Shen et al., 2010; Zhou, 2013
Behavioural intention	I intend to use NFC MPs in the future; I will always try to use NFC MPs in my daily life; I plan to use NFC MPs frequently.	Venkatesh et al., 2012

Table 2. Characteristics of respondents

Demographic	Group	Frequency	Percentage
Age	18-24	57	23.4
	25-34	53	21.7
	35-44	38	15.6
	45-54	40	16.4
	55-64	47	19.3
	65+	9	3.7
Gender	Male	106	43.4
	Female	138	56.6
Employment status	Employed full-time	127	52.0
	Employed part-time	27	11.1
	Self-employed	15	6.6
	Full-time student	55	22.5
	Retired	14	5.7
	Unemployed	5	2.0

Table 3. Factor analysis results

Rotated Component Matrix[a]									
	Component								
	1	2	3	4	5	6	7	8	9
PE1									.616
PE2									.699
PE3									.717
EE1		.825							
EE2		.704							
EE3		.897							
EE4		.874							
SI1				.933					
SI2				.931					
SI3				.936					
FC1								.656	
FC2								.623	
FC3								.766	
FC4								.683	
PV1						.927			
PV2						.922			
PV3						.895			
HM1					.852				
HM2					.840				
HM3					.839				
PR1	.870								
PR2	.905								
PR3	.872								
PR4	.867								
PR5	.758								
PR6	.819								
TRU1			.761						
TRU2			.845						
TRU3			.818						
TRU4			.783						
HT1							.792		
HT2							.867		
HT3							.853		

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

Table 4. Regression results: UTAUT2

Model Adjusted R square 0.527	Standardized coefficients Beta	t	Sig.	Collinearity statistics VIF	Hypotheses support
Constant		2.236	.026		
Performance expectancy	.489	7.925	.000	1.957	H1: Supported
Effort expectancy	-.067	-1.251	.212	1.453	H2: Not supported
Social influence	.106	2.097	.037	1.322	H3: Supported
Facilitating conditions	.066	1.248	.213	1.458	H4: Not supported
Price value	-.009	-.194	.847	1.087	H5: Not supported
Habit	.180	3.537	.000	1.330	H6: Supported
Hedonic motivation	.160	2.611	.010	1.932	H7: Supported

Table 5. Regression results: UTAUT2 extended with perceived risk and trust

Model Adjusted R square 0.584	Standardized coefficients Beta	t	Sig.	Collinearity statistics VIF	Hypotheses support
Constant		3.225	.001		
Performance expectancy	.382	6.234	.000	2.192	H1: Supported
Effort expectancy	-.093	-1.863	.064	1.469	H2: Not supported
Social influence	.146	3.033	.003	1.360	H3: Supported
Facilitating conditions	.039	.779	.437	1.473	H4: Not supported
Price value	-.024	-.543	.588	1.096	H5: Not supported
Habit	.140	2.888	.004	1.363	H6: Supported
Hedonic motivation	.111	1.900	.059	1.982	H7: Not supported
Trust in provider	.159	2.781	.006	1.896	H8: Supported
Perceived risk	-.173	-2.964	.003	1.991	H9: Supported